

Cochlospermum macnamarae (Bixaceae), a rare, new endemic from the Pilbara bioregion of Western Australia

Michael Hislop^{1,3}, Kevin R. Thiele¹ and Daniel Brassington²

¹Western Australian Herbarium, Department of Environment and Conservation,
Locked Bag 104, Bentley Delivery Centre, Western Australia 6983

²Western Botanical, Landcare Holdings Pty Ltd,

19 McDonald Crescent, Bassendean, Western Australia 6054

³Corresponding author, email: Michael.Hislop@dec.wa.gov.au

Abstract

Hislop, M., Thiele, K.R. & Brassington, D. *Cochlospermum macnamarae* (Bixaceae), a rare, new endemic from the Pilbara bioregion of Western Australia. *Nuytsia* 23: 89–94 (2013). A new species of *Cochlospermum* Kunth, *C. macnamarae* Hislop, K.R. Thiele & Brassington, is described, illustrated and mapped. It occurs in the semi-arid Pilbara bioregion of Western Australia, unlike the other Australian species which all occur in the wet-dry tropics. A revised key to the genus in Australia is provided to accommodate the new species.

Introduction

The taxonomy of the Australian members of the pantropical genus *Cochlospermum* Kunth has changed little since Bentham's treatment in *Flora Australiensis* (1863). Indeed it was Bentham who described the last new species for Australia, *C. gillivraei* Benth. The four species recognised in that treatment became three when Poppendieck (1980) reduced *C. heteronemum* F.Muell. to a subspecies of *C. fraseri* Planch. This change was accepted by George (1982) in his account of the genus for the *Flora of Australia*. The most recent and best-illustrated treatment of the genus appears in the *Flora of the Darwin region* (Kerrigan & Dixon 2011). Before the discovery of the new species described in this paper, *Cochlospermum* had been represented in Western Australia by just one species, the widespread *C. fraseri* which occurs from the Kimberley Botanical Province to far north-western Queensland.

In September 2011 while engaged in a flora survey for a rail easement, members of Western Botanical environmental consultancy made collections of a *Cochlospermum* from a remote part of the Pilbara bioregion (Department of the Environment, Water, Heritage and the Arts 2008). A preliminary investigation soon revealed that a significant botanical discovery had been made. Not only was it the first record of the genus for the Pilbara bioregion, but it quickly became apparent that the collections were not referable to *C. fraseri*. Although as currently understood *C. fraseri* is morphologically variable, the small flowers and especially the small, very deeply lobed leaves of the Pilbara plants did not match any of the variation documented for that species. Of the other two Australian members of the genus, *C. gregorii* F.Muell. and *C. gillivraei* (both of which occur widely in the Top End of the Northern Territory and the Gulf Country and Cape York Peninsula in Queensland), the latter was most similar to the Pilbara plants. Comparisons with that species have shown that the new species can always be distinguished by its smaller leaves with significantly narrower lobes, and smaller flowers.

Species of *Cochlospermum* differ mainly in quantitative features, particularly in the nature and proportions of leaf lobing, rather than in qualitative floral or fruiting features. In this context, and given the geographical and ecological disjunction, we believe that the degree of morphological distinction is consistent with the recognition of a new species, which is described herein as *C. macnamarae* Hislop, K.R.Thiele & Brassington.

Methods

The description of the new species is based on examination of *Cochlospermum* collections housed at PERTH and of specimens of *C. gillivraei* and *C. gregorii* loaned from CANB. Additional measurements of specimens of *C. gillivraei* housed at DNA were made by Ian Cowie. Foliar measurements were taken from dried specimens, and floral measurements from rehydrated flowers.

Taxonomy

Cochlospermum macnamarae Hislop, K.R.Thiele & Brassington, *sp. nov.*

Typus: c. 180 km north-west of Newman, Western Australia [precise locality withheld for conservation reasons], 30 September 2011, D. Brassington, E. Ager & J. Macknay LCH 31756 (*holo*: PERTH 08330026; *iso*: CANB).

Cochlospermum sp. Pilbara (D. Brassington, E. Ager & J. Macknay LCH 31756), Western Australian Herbarium, in *FloraBase*, <http://florabase.dec.wa.gov.au> [accessed 15 February 2013].

Spreading, multi-stemmed *shrubs* to c. 2 m high and 3 m wide, from a robust (possibly fire-tolerant) rootstock. Young *stems* glabrous, shiny, copper-brown, becoming grey and \pm fissured with age. *Stipules* subulate, caducous, 3–4 mm long, glabrous or with a few glandular hairs about the margins. *Petioles* 35–70 mm long, glabrous but with a scurfy excrescence towards the base. *Lamina* palmatifid, 5–7-lobed, divided for 3/4–7/8 of its length, 50–80 mm long, 55–105 mm wide, glabrous; *base* cordate; *lobes* \pm linear, very narrowly ovate or very narrowly elliptic, 20–55 mm long, 4–10 mm wide with length: width ratio 5.2–8: 1, acute or acuminate, the margins entire or with one or two coarse teeth. *Inflorescence* a terminal panicle to c. 80 mm long, mostly glabrous but usually with some irregular, glandular hairs at the nodes; *bracts* caducous, ovate or broadly ovate, 3–5 mm long, 2–3 mm wide, mostly with a few glandular hairs about the margins. *Sepals* ovate or broadly ovate, glabrous except the margins ciliolate with glandular hairs; *outer sepals* 11–13 mm long, 6.5–8.5 mm wide, obtuse; *inner sepals* 12–16 mm long, 8.5–10 mm wide, \pm emarginate with a short, excentric, recurved mucro. *Petals* yellow, obovate, emarginate, 22–27 mm long, 13–15 mm wide. *Stamens* multiseriate, dimorphic, the outer whorl with longer, thicker filaments and larger anthers than the four inner whorls; *outer filaments* red, 9–10 mm long, c. 0.7 mm wide; *outer anthers* 3.2–3.3 mm long, 0.8–0.9 mm wide, the apical pore 0.4–0.45 mm diam.; *inner filaments* yellow, 4.5–5 mm long, c. 0.2 mm wide; *inner anthers* 2.3–2.7 mm long, 0.5–0.6 mm wide, the apical pore 0.3–0.35 mm diam. *Ovary* depressed-globose, 2.5–3 mm diam.; *style* sigmoid, 15–18 mm long. *Capsule* pendant, obovoid, c. 50 mm long and 30 mm wide; mature seeds not seen. (Figure 1)

Diagnostic characters. The new species can be distinguished from other Australian species by its shrubby habit, very deeply and narrowly lobed leaves and small flowers.



Figure 1. *Cochlospermum macnamarae*. A – habit and habitat; B – mature leaves; C – flowers; D – fruit; E – base of plants showing numerous stems from rootstock. All photos D. Brassington, from the type locality..

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 30 Sep. 2011, *D. Brassington, E. Ager & J. Macknay* LCH 31707 (PERTH); 30 Sep. 2011, *D. Brassington, E. Ager & J. Macknay* LCH 31708 (PERTH); 30 Sep. 2011, *D. Brassington, E. Ager & J. Macknay* LCH 31755 (PERTH).

Distribution and habitat. Currently known only from a small area in the central part of the Pilbara bioregion about 160 km south of Port Hedland (Figure 2), where it occurs on the upper slopes of a low hill in shallow, stony soil closely underlain by granitic bedrock (Figure 3). Plants grow as isolated shrubs over very open *Triodia* grassland.

Phenology. Other Australian species of *Cochlospermum*, found in areas with more regular monsoonal wet-dry seasons, are regularly dry season deciduous, mostly losing their leaves completely after the onset of the dry. Flowering typically commences in the Kimberley and Northern Territory as the leaves fall in the early to mid dry season (April–June), with fruiting beginning around June and continuing until new leaf growth commences with storm rains towards the end of the dry season and early wet (I. Cowie, R. Barrett pers. comm.). On low regenerating plants, leaves may emerge following fire in the early dry season.

Cochlospermum macnamarae, by contrast, grows in a semi-arid environment with more irregular rainfall. At the time of its collection in late September, plants in the population were at a range of phenological stages. Some had shed most of their leaves, some had a more or less full canopy of mature green leaves while others were at an intermediate stage with some leaves green and others yellowing prior to abscission. Most had at least some flowers present, and fruit was also present on some plants. The exact timing of leaf drop, flowering and new leaf growth in *C. macnamarae* is likely to be determined by local rainfall in the current and preceding season, and may be seasonably variable. Variation between plants within a population is likely to be associated with micro-site differences in degree of exposure and moisture retention.

Etymology. The species epithet honours Keiran McNamara, Director General since 2001 of the Department of Conservation and Land Management (CALM) and later the Department of Environment and Conservation (DEC). As Director General, Keiran strongly supported science, including taxonomic research conducted at the Western Australian Herbarium. In particular, his specific support for targeted taxonomic research on potential species of conservation concern resulted in the publication of 154 new plant taxa in Western Australia, 119 of which are conservation-listed. This is a remarkable legacy.

Under the *International Code of Nomenclature for algae, fungi, and plants* (McNeill *et al.* 2012), Mc surnames are spelled in full as Mac when Latinised, and surnames ending with -a are terminated -ae.

Conservation status. *Cochlospermum macnamarae* is currently known from a single population of about 180 plants situated mostly on land designated as a rail corridor. This species has been listed, under its phrase name *C. sp.* Pilbara (*D. Brassington, E. Ager & J. Macknay* LCH 31756), as Priority One under the Department of Environment and Conservation's Conservation Codes for Western Australian Flora (Smith 2012).

Affinities. *Cochlospermum macnamarae* is most similar in leaf morphology to *C. gillivraei*, from which it differs in its narrower leaf lobes and smaller flowers. It can be readily distinguished from *C. fraseri*, the only other species known to occur in Western Australia, by its leaves (which are much more deeply lobed), red outer staminal filaments, and low, multi-stemmed, shrubby habit (which contrasts with the single-stemmed, tree-like habit of *C. fraseri*).

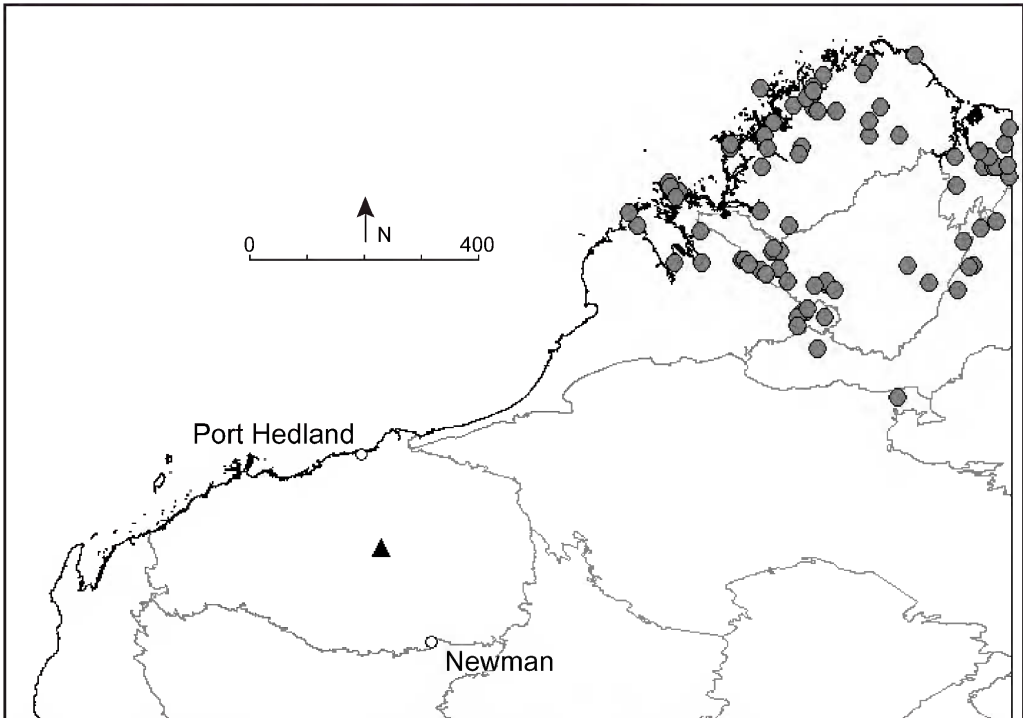


Figure 2. Distribution of *Cochlospermum macnamarae* (▲) and *C. fraseri* (●) in Western Australia.



Figure 3. *Cochlospermum macnamarae* growing in shallow, stony soil closely underlain by granitic bedrock.

Key to the Australian species of *Cochlospermum*

1. Leaves palmatisect or occasionally the lobes fused for 1–2 mm.....**C. gregorii**
- 1: Leaves palmatifid, divided for up to seven eighths of their length
2. Leaves usually divided for less than half their length, occasionally up to two thirds, or sometimes \pm unlobed; lobes obtuse, but occasionally abruptly mucronulate; staminal filaments all yellow**C. fraseri**
- 2: Leaves always divided for more than half their length, usually between two thirds and seven eighths; lobes acute to acuminate; at least the outer filaments red
3. Leaf lobes broad (widest lobe (14–)17–40 mm wide at the widest point), narrowly ovate, tapering markedly towards the base, the length: width ratio 2–3.4: 1; petals 29–40 mm long, 12–25 mm wide.....**C. gillivraei**
- 3: Leaf lobes narrow (widest lobe 7–10 mm wide at the widest point), \pm linear, very narrowly ovate or very narrowly elliptic, usually not tapering towards the base, the length: width ratio 5.2–8: 1; petals 22–27 mm long, 13–15 mm wide**C. macnamarae**

Acknowledgements

We would like to thank the following people for assisting in the preparation of this paper: Ian Cowie for providing leaf measurements of *Cochlospermum gillivraei* specimens housed at DNA, Brendan Lepshi for facilitating a loan of *C. gillivraei* and *C. gregorii* from CANB, Geoff Cockerton and Martin Henson for providing additional site information, Ryonen Butcher for producing the distribution map, and David Coates, Margaret Byrne, Stephen van Leeuwen and Ian Cowie for helpful comments on the manuscript.

References

- Bentham, G. (1863). *Flora Australiensis*. Vol. 1. pp. 105–107. (Reeve & Co.: London.)
- Department of the Environment, Water, Heritage and the Arts (2008). *Interim Biogeographic Regionalisation for Australia (IBRA), Version 6.1*. <http://www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/index.html> [accessed 14 October 2009].
- George, A.S. (1982). *Cochlospermum*. In: George, A.S. (ed.) *Flora of Australia*. Vol. 8. pp. 86–88. (Australian Government Publishing Service: Canberra.)
- Kerrigan, R.A. & Dixon, D.J. (2011). Bixaceae. In: Short, P.S. & Cowie, I.D. (eds.) *Flora of the Darwin region*. Vol. 1. pp. 1–6. Northern Territory Herbarium, Department of Natural Resources, Environment, the Arts and Sport. http://www.nt.gov.au/nreta/wildlife/plants_herbarium/index.html [accessed 15 February 20].
- McNeill, J., Barrie, F.R., Buck, W.R., Demoulin, V., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Marhold, K., Prado, J., Prud'homme van Reine, W.F., Smith, G.F., Wiersema, J.H. & Turland, N.J. (eds) (2012). *International Code of Nomenclature for algae, fungi and plants (Melbourne Code) adopted by the Eighteenth International Botanical Congress Melbourne, Australia, July 2011*. (Koeltz Scientific: Königstein, Germany.)
- Poppendieck, H.-H. (1980). A monograph of Cochlospermeaceae. *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 101: 236–240.
- Smith, M. (2012). *Threatened and Priority Flora list for Western Australia*. (Department of Environment and Conservation: Kensington, Western Australia.)